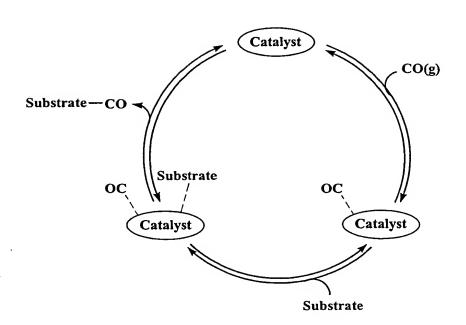
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FIG.1



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FIG.2A

Microwave-assisted palladium-catalyzed amidation utilizing in situ generated carbon monoxide from $Mo(CO)_6$.

Microwave-assisted palladium-catalyzed generation of p-methyl benzoic acid from tolyl iodide utilizing in situ generated carbon monoxide from [Mo(CO)₆].

^aAverage isolated yields from 2-3 runs (0.23 mmol scale, SmithSynthesizer™, >95% by GC/MS). $^{\rm D}p$ -Methyl-benzoic acid . Ethylene glycol was added as co-solvent.

entry, aryl-X 1, 1a MeO- 2, 1a Me- 3, 1a F ₃ C- 4, 1a Ac- 6, 1a MeO- 7, 1a F ₃ C- 8, 1a Ac- 9, 1a Me- 10, 1b MeO- 11, 1b MeO- 11, 1b MeO- 12, 1a MeO- 13, 1a F ₃ C- 14, 1a Ac- 15, 1a MeO- 16, 1b F ₃ C- 17, 1b MeO- 18, 1b MeO- 18, 1b MeO- 18, 1c MeO- 18, 1b Me- 10, 1b MeO- 11, 1b MeO- 12, 1b F ₃ C- 13, 1b Ac- 14, 1b MeO- 15, 1b MeO- 16, 1b F ₃ C- 17, 1b MeO- 18, 1c MeO- 18, 1c MeO- 19, 1c MeO- 11, 1c MeO- 11, 1c MeO- 12, 1c MeO- 13, 1c MeO- 14, 1c MeO- 15, 1c MeO- 16, 1c MeO- 17, 1c MeO- 18, 1c MeO- 18, 1c MeO- 19, 1c MeO- 11, 1c MeO- 11, 1c MeO- 12, 1c MeO- 13, 1c MeO- 14, 1c MeO- 15, 1c MeO- 16, 1c MeO- 17, 1c MeO- 18, 1					
1, 1a MeO- n-BuNH ₂ 2a 70 2, 1a Me- n-BuNH ₂ 2b 71 3, 1a F ₃ C- n-BuNH ₂ 2c 75 4, 1a Ac- n-BuNH ₂ 2d 77 5, 1a MeO- Piperidine 2e 65 6, 1a Me- Piperidine 2f 66 7, 1a F ₃ C- Piperidine 2h 83 9, 1a Me- Benzyl 2i 48 amine 10, 1b MeO- n-BuNH ₂ 2a 69 11, 1b Me- n-BuNH ₂ 2b 72 12, 1b F ₃ C- n-BuNH ₂ 2c 78 13, 1b Ac- n-BuNH ₂ 2d 79 14, 1b MeO- Piperidine 2e 66 15, 1b Me- Piperidine 2f 69 16, 1b F ₃ C- Piperidine 2f 69 16, 1b F ₃ C- Piperidine 2f 69 17, 1b Ac- Piperidine 2g 75	entry,	R-group	nucleophile	product	yield ^a
2, 1a Me- 3, 1a F ₃ C- 1, -BuNH ₂ 2, 1a MeO- 4, 1a Ac- 5, 1a MeO- 5, 1a MeO- 6, 1a Me- 7, 1a F ₃ C- 8, 1a Ac- 9, 1a Piperidine 10, 1b MeO- 11, 1b Me- 12, 1b F ₃ C- 12, 1b F ₃ C- 13, 1b Ac- 14, 1b MeO- 15, 1b MeO- 16, 1b MeO- 16, 1b F ₃ C- 17, 1b MeO- 18, 1a Ac- 19, 1a Me- 10, 1b MeO- 10, 1b MeO- 11, 1b Me- 12, 1b F ₃ C- 13, 1b Ac- 14, 1b MeO- 15, 1b MeO- 16, 1b F ₃ C- 17, 1b Ac- 17, 1b Ac- 18, 1a Ac- 19, 1a MeO- 10, 1b MeO- 10, 1b MeO- 11, 1b MeO- 11, 1b MeO- 12, 1b F ₃ C- 13, 1b Ac- 14, 1b MeO- 15, 1b MeO- 16, 1b F ₃ C- 17, 1b Ac- 18, 18, 18, 18, 18, 18, 18, 18, 18, 18,	aryl-X				(%)
3, 1a F ₃ C- n-BuNH ₂ 2c 75 4, 1a Ac- n-BuNH ₂ 2d 77 5, 1a MeO- Piperidine 2e 65 6, 1a Me- Piperidine 2f 66 7, 1a F ₃ C- Piperidine 2h 83 9, 1a Me- Benzyl 2i 48 amine 10, 1b MeO- n-BuNH ₂ 2a 69 11, 1b Me- n-BuNH ₂ 2b 72 12, 1b F ₃ C- n-BuNH ₂ 2c 78 13, 1b Ac- n-BuNH ₂ 2d 79 14, 1b MeO- Piperidine 2e 66 15, 1b Me- Piperidine 2f 69 16, 1b F ₃ C- Piperidine 2g 75 17, 1b Ac- Piperidine 2h 76	1, 1 a	MeO-	n-BuNH ₂	2a	70
4, 1a Ac- n-BuNH ₂ 2d 77 5, 1a MeO- Piperidine 2e 65 6, 1a Me- Piperidine 2f 66 7, 1a F ₃ C- Piperidine 2h 83 9, 1a Me- Benzyl 2i 48 amine 10, 1b MeO- n-BuNH ₂ 2a 69 11, 1b Me- n-BuNH ₂ 2b 72 12, 1b F ₃ C- n-BuNH ₂ 2c 78 13, 1b Ac- n-BuNH ₂ 2d 79 14, 1b MeO- Piperidine 2e 66 15, 1b Me- Piperidine 2f 69 16, 1b F ₃ C- Piperidine 2g 75 17, 1b Ac- Piperidine 2h 76	2, 1a	Me-	n-BuNH ₂	2 b	71
5, 1a MeO- Piperidine 2e 65 6, 1a Me- Piperidine 2f 66 7, 1a F ₃ C- Piperidine 2g 74 8, 1a Ac- Piperidine 2h 83 9, 1a Me- Benzyl 2i 48 amine 10, 1b MeO- n-BuNH ₂ 2a 69 11, 1b Me- n-BuNH ₂ 2b 72 12, 1b F ₃ C- n-BuNH ₂ 2c 78 13, 1b Ac- n-BuNH ₂ 2d 79 14, 1b MeO- Piperidine 2e 66 15, 1b Me- Piperidine 2f 69 16, 1b F ₃ C- Piperidine 2g 75 17, 1b Ac- Piperidine 2h 76	3, 1a	F ₃ C-	n-BuNH ₂	2c	75
6, 1a Me- Piperidine 2f 66 7, 1a F ₃ C- Piperidine 2g 74 8, 1a Ac- Piperidine 2h 83 9, 1a Me- Benzyl 2i 48 amine 10, 1b MeO- n-BuNH ₂ 2a 69 11, 1b Me- n-BuNH ₂ 2b 72 12, 1b F ₃ C- n-BuNH ₂ 2c 78 13, 1b Ac- n-BuNH ₂ 2d 79 14, 1b MeO- Piperidine 2e 66 15, 1b Me- Piperidine 2f 69 16, 1b F ₃ C- Piperidine 2g 75 17, 1b Ac- Piperidine 2h 76	4, 1a	Ac-	n-BuNH ₂	2d	77
7, 1a F ₃ C- Piperidine 2g 74 8, 1a Ac- Piperidine 2h 83 9, 1a Me- Benzyl 2i 48 amine 10, 1b MeO- n-BuNH ₂ 2a 69 11, 1b Me- n-BuNH ₂ 2b 72 12, 1b F ₃ C- n-BuNH ₂ 2c 78 13, 1b Ac- n-BuNH ₂ 2d 79 14, 1b MeO- Piperidine 2e 66 15, 1b Me- Piperidine 2f 69 16, 1b F ₃ C- Piperidine 2g 75 17, 1b Ac- Piperidine 2h 76	5, 1a	MeO-	Piperidine	2e	65
8, 1a Ac- Piperidine 2h 83 9, 1a Me- Benzyl 2i 48 amine 10, 1b MeO- n-BuNH2 2a 69 11, 1b Me- n-BuNH2 2b 72 12, 1b F ₃ C- n-BuNH2 2c 78 13, 1b Ac- n-BuNH2 2d 79 14, 1b MeO- Piperidine 2e 66 15, 1b Me- Piperidine 2f 69 16, 1b F ₃ C- Piperidine 2g 75 17, 1b Ac- Piperidine 2h 76	6, 1a	Me-	Piperidine	2f	66
9, 1a Me- Benzyl 2i 48 amine 10, 1b MeO- n-BuNH2 2a 69 11, 1b Me- n-BuNH2 2b 72 12, 1b F ₃ C- n-BuNH2 2c 78 13, 1b Ac- n-BuNH2 2d 79 14, 1b MeO- Piperidine 2e 66 15, 1b Me- Piperidine 2f 69 16, 1b F ₃ C- Piperidine 2g 75 17, 1b Ac- Piperidine 2h 76	7, 1a	F ₃ C-	Piperidine	2g	74
amine 10, 1b MeO- n-BuNH ₂ 2a 69 11, 1b Me- n-BuNH ₂ 2b 72 12, 1b F ₃ C- n-BuNH ₂ 2c 78 13, 1b Ac- n-BuNH ₂ 2d 79 14, 1b MeO- Piperidine 2e 66 15, 1b Me- Piperidine 2f 69 16, 1b F ₃ C- Piperidine 2g 75 17, 1b Ac- Piperidine 2h 76	8, 1a	Ac-	Piperidine	2h	83
10, 1b MeO- n-BuNH ₂ 2a 69 11, 1b Me- n-BuNH ₂ 2b 72 12, 1b F ₃ C- n-BuNH ₂ 2c 78 13, 1b Ac- n-BuNH ₂ 2d 79 14, 1b MeO- Piperidine 2e 66 15, 1b Me- Piperidine 2f 69 16, 1b F ₃ C- Piperidine 2g 75 17, 1b Ac- Piperidine 2h 76	9, 1a	Me-	Benzyl	2i	48
11, 1b Me- n-BuNH2 2b 72 12, 1b F3C- n-BuNH2 2c 78 13, 1b Ac- n-BuNH2 2d 79 14, 1b MeO- Piperidine 2e 66 15, 1b Me- Piperidine 2f 69 16, 1b F3C- Piperidine 2g 75 17, 1b Ac- Piperidine 2h 76			amine		
12, 1b F ₃ C- n-BuNH ₂ 2c 78 13, 1b Ac- n-BuNH ₂ 2d 79 14, 1b MeO- Piperidine 2e 66 15, 1b Me- Piperidine 2f 69 16, 1b F ₃ C- Piperidine 2g 75 17, 1b Ac- Piperidine 2h 76	10, 1b	MeO-	n-BuNH ₂	2a	69
13, 1b Ac- n-BuNH ₂ 2d 79 14, 1b MeO- Piperidine 2e 66 15, 1b Me- Piperidine 2f 69 16, 1b F ₃ C- Piperidine 2g 75 17, 1b Ac- Piperidine 2h 76	11, 1b	Me-	n-BuNH ₂	2 b	72
14, 1b MeO- Piperidine 2e 66 15, 1b Me- Piperidine 2f 69 16, 1b F ₃ C- Piperidine 2g 75 17, 1b Ac- Piperidine 2h 76	12, 1 b	F ₃ C-	n-BuNH ₂	2c	78
15, 1b Me- Piperidine 2f 69 16, 1b F ₃ C- Piperidine 2g 75 17, 1b Ac- Piperidine 2h 76	13, 1b	Ac-	n-BuNH ₂	2d	79
16, 1b F ₃ C- Piperidine 2g 75 17, 1b Ac- Piperidine 2h 76	14, 1b	MeO-	Piperidine	2e	66
17, 1b Ac- Piperidine 2h 76	15, 1b	Me-	Piperidine	2f	69
	16, 1b	F ₃ C-	Piperidine	2g	75
18, 1b Me- Water 3 87 ^b	17, 1b	Ac-	Piperidine	2h	76
18, 1b Me- Water 3 87 ^b			-		
	18, 1b	Me-	Water	3	87 ^b

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FIG.2B

4-Acetyl-*N-n***-butyl-benzamide (2d).** White crystals. ¹H NMR (19 °C, TMS): δ7.90 (d, 2H; Aryl), 7.77 (d, 2H; Aryl), 6.4 (bs, 1H; CONH), 3.39 (q, 2H; N-CH₂), 2.45 (s, 3H; COCH₃), 1.54 ppm (m, 2H; CH₂), 1.33 (m, 2H; CH₂), 0.89 (t, 3H; CH₃); ¹³C NMR (CDCl₃, 25 °C, TMS): δ197 (CO), 166 (CONH), 138,9 (C-ipso), 138,7 (C-ipso), 128 (C-HAryl), 127 (CHAryl), 40 (C-aliphatic), 31 (C-aliphatic), 27 (C-aliphatic), 20 (C-aliphatic), 14 (C-aliphatic). MS (70 eV): m/z (%): 219 (10) [M[†]], 177 (25), 147 (100). Elemental Analysis: Calculated for C₁₃H₁₇NO₂: C, 71.2; N, 6.4; H, 7.8; Found: C, 71.6; N, 6.3; H, 7.9.

4-Trifluoromethylphenyl-piperidin-1-yl-methanone (2g). Yellow oil. ¹H NMR (19 °C, TMS): δ7.66 (d, 2H; Aryl), 7.48 (d, 2H; Aryl), 3.75 (bs, 2H; CH₂), 3.32 (bs, 2H; CH₂), 1.67 (bs, 4H; CH₂), 1.52 (bs, 2H; CH₂); ¹³C NMR (25 °C, TMS): δ 168 (CO), 140 (C-ipso), 131 (q; CF₃), 127 (CHAryl), 126 (CHAryl), 122 (C-ipso), 49 (broad, C-aliphatic), 43 (broad, C-aliphatic), 27 (broad, C-aliphatic), 26 (broad, C-aliphatic), 24 (C-aliphatic). MS (70 eV): m/z (%): 256 (80) [M+-1], 173 (100), 145 (75). Elemental Analysis: Calculated for C₁₃H₁₄F₃NO × ½H₂O: C, 58.6; N, 5.3; H, 5.7; Found: C, 58.8; N, 5.1;



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FIG.3

FIG.4

1a-c 2a-d 3a-f

	R1	R2	Time (s)	Conversion of	Isolated Yields (%) of
				·	3
1a	4-OMe	2a -nBu	300	90%	3a 75%
1b	2-Me	2a -nBu	300	Fuli	3b 46%
1a	4-OMe	2b - <i>t</i> Bu	900	Full	3c 38%
1a	4-OMe	2c -CH₂Ph	900	b	3d 36%
1a	4-OMe	2d -CH ₂ CH ₂ Si(Me) ₃	900	Full	3e 65%
1c	4-CF ₃	2d -CH ₂ CH ₂ Si(Me) ₃	900	Full	3f 65%

^aMeasured with GC-MS on crude products. ^bnot detected with GC-MS.

Number	Structure	Name
		Butyl-4-methoxybensoate
3b		Butyl-4-methylbensoate
30		<i>t</i> -Butyl-4-methoxybensoate
3d		Bensyl-4-methoxybensoate
36		(2-trimethylsilanylethyl)-4-methoxybensoate
3f	F F Si	(2-trimethylsilanylethyl)-4-trifluoromethylbensoate



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FIG.6